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Brief Summary Text (10):
In such a case, the controlled torque of the first motor and the generated torque of the engine interfere with each other, and continued torque control will cause an excessive rise in the engine rpm by the torque of the first motor. This will consequently cause the engine rpm to overshoot at the completion of the startup, leading to uncomfortable startup. In addition, more electric energy than necessary will be drawn out of the electricity storing unit in order to generate the torque at the first motor, resulting in deteriorated energy efficiency. The problem can be controlled to a minimum if the complete explosion at the time of engine startup can be accurately detected and the engine can be properly controlled according to the startup state. In other words, a failure to accurately detect complete explosion will make the problem worse.

Brief Summary Text (18):
In addition, according to the invention set forth in claim 4, a charge state detecting means detects overcharge or overdischarge of an electricity storing means due to a control error or the like during driving, and at least one of the following corrections is made so as to eliminate the energy going into or out of the electricity storing unit: the vehicle driving torque command value is corrected according to the charge state of the electricity storing means, the vehicle driving power demand value supplied to the engine controller is corrected, or the engine rpm command value received from the engine controller is corrected. Hence, the weight of the mounted electricity storing unit can be controlled to a minimum, permitting a reduced weight of the vehicle and higher system efficiency. Moreover, since there will be no overcharge or overdischarge of the electricity storing means, there will be no malfunction of the traveling vehicle, meaning that efficient driving is always ensured as long as engine fuel is supplied.

Brief Summary Text (19):
According to the system set forth in claim 5, a terminal voltage VB of the electricity storing means is detected, and at least one of the following corrections is made so as to maintain the terminal voltage of the electricity storing means at a predetermined voltage: the vehicle driving torque command value is corrected, the engine rpm command value supplied to the engine controller is corrected, or the engine rpm command value received from the engine controller is corrected. Hence, the transient flow of energy into or out of the electricity storing unit can be controlled to a minimum and the steady flow of energy into or out of the electricity storing unit can be eliminated, enabling the weight of the mounted electricity storing unit to be controlled to a minimum and the weight of the vehicle to be accordingly reduced with resultant higher system efficiency. Moreover, since there will be no overcharge or overdischarge of the electricity storing means, there will be no malfunction of the traveling vehicle, meaning that efficient driving is always ensured as long as engine fuel is supplied.

Brief Summary Text (21):
Further, according to the system set forth in claim 7, a temperature detector detects the temperature of or in the vicinity of the electricity storing means, and the terminal voltage VB of the electricity storing means is corrected according to the detected temperature. This makes it possible to prevent the overcharge of the electricity storing means when the temperature is low or to prevent the overdischarge thereof when the temperature is high, thus preventing deterioration in the performance of the electricity storing unit.

Drawing Description Text (72):
FIG. 64 is a flowchart illustrative of a system state detecting program implemented by the hybrid controller;

Detailed Description Text (4):
The system shown in the drawing is further equipped with the following group of sensors. Specifically, an accelerator pedal, not shown, which is operated by a driver is provided with a publicly known accelerator sensor 7. The sensor 7 issues an accelerator lift signal, which corresponds to the depression of the accelerator pedal, in terms of a voltage signal. A brake pedal, not shown, which is operated by the driver is provided with a publicly known brake sensor 8. The brake sensor 8 issues a brake signal, which corresponds to the depression of the brake pedal, in terms of an ON/OFF signal. A shift switch 9 detects a plurality of shift positions; in this embodiment, it outputs in parallel shift signals such as parking (P), reverse (R), neutral (N), and drive (D) in terms of ON/OFF signals. A start switch 10 is built in a publicly known iG key switch which is not shown; it issues ON/OFF signals corresponding to the presence or absence of start.

Detailed Description Text (9):
Further in this control system, a current detector 17 serving as a charge state detecting means is provided between the inverter 14 and the electricity storing unit 15. the current detector 17 detects the current flowing through the electricity storing unit 15 and transmits the detection result to the inverter 14.

Detailed Description Text (14):
Reference numerals 2911 and 2912 denote rotation sensors composed of publicly known resolvers; they detect rotational positions .theta.1 and .theta.2 and rpms Nm1 and Nm2 of the first rotor 2010 and the second rotor 2310, respectively, as the revolution information on the first rotary electric unit 2000 and the second rotary electric unit 3000, using the stator 3010 as the reference. Reference numeral 1730 denotes a cover case which houses the brush holder 2610 and the rotation sensor 2911.

Detailed Description Text (16):
In FIG. 3, reference numeral 1301 indicates a revolution detector of the engine 1. The revolution detector is publicly known although the details thereof are not illustrated; it issues 12 pulses of angular signal and 1 pulse of reference signal each time a crankshaft, not shown, of the engine 1 makes one turn. Reference numeral 1302 indicates a publicly known intake air volume sensor; although the details thereof are not illustrated, the intake air volume sensor is provided on the inlet pipe 3, and the vane opening thereof changes according to the volume of air taken into the engine 1. The changes in the vane opening are detected by a potentiometer, and the volume of air introduced into the engine 1 is detected in terms of an air volume signal indicative of the volume per unit time.

Detailed Description Text (17):
Reference numeral 1303 denotes a publicly known thermistor type cooling water temperature sensor which is mounted on the engine 1; it detects the temperature of the cooling water of the engine 1 as resistance and outputs a cooling water temperature signal. Reference numeral 1304 indicates a publicly known thermistor type intake air temperature sensor; it is provided on the intake air volume sensor

1302 and it detects the temperature of the air taken into the engine 1 as resistance and issues the detection result in terms of an intake air temperature signal. Reference numeral 1305 denotes a publicly known air-fuel ratio sensor which is provided on an exhaust pipe assembly (not shown) of the engine 1; it issues the air-fuel ratio of exhaust in terms of voltage as an air-fuel ratio signal. The signals of these sensors and the start signal of the start switch 10 are connected to the engine controller 13. Reference numeral 1306 indicates a control unit having the same configuration as that of a publicly known engine controller; it is constituted primarily by a microcomputer and the driving circuit of the fuel injection solenoid valve 4, and it generates a valve opening signal for the fuel injection solenoid valve 4 in accordance with the angle signal and reference signal of the engine rpm detector 1301, the air volume signal of the intake air volume sensor 1302, the cooling water temperature signal of the cooling water temperature sensor 1303, the intake air temperature signal of the intake air temperature sensor 1304, and the air-fuel ratio signal of the air-fuel ratio sensor 1305. Reference numeral 1307 denotes a communication circuit; it is, for instance, a publicly known circuit which permits a start-stop synchronization communication, and it is connected to the control unit 1306.

Detailed Description Text (21):
In step S5001, the engine rpm Ne is captured and stored in the variable area of the RAM built in the control unit 1306. Next, in step S5002, intake air volume Q is captured and stored in the variable area of the RAM built in the control unit 1306. Then, in step S5003, cooling water temperature Tw is captured and stored in the variable area of the RAM built in the control unit 1306. Next, in step S5004, intake air temperature Ta is captured and stored in the variable area of the RAM built in the control unit 1306. In step S5005, air-fuel ratio A/F is captured and stored in the variable area of the RAM built in the control unit 1306. In step S5006, intake air volume Qo per revolution is calculated from the engine rpm Ne captured in step S5001 and the intake air volume Q captured in step S5002, and it is stored in the variable area of the built-in RAM. In step S5007, the intake air temperature correction coefficient map, which has been stored in the table area of the ROM built in the control unit 1306, is searched for an intake air temperature correction coefficient fTHA according to the intake air temperature Ta captured in step S5004. The intake air temperature correction coefficient map is a publicly known one shown in FIG. 5; it is provided with the coefficients for converting the intake air volume detected by the intake air volume sensor 1302 to the mass per unit time in the form of a one-dimensional map.

Detailed Description Text (31):
As in the case of the IGBT module 1413, the IGBT modules 1414 and 1415 are configured to drive the V-phase winding and the W-phase winding Of the first rotary electric unit 2000 as illustrated. The IGBT modules 1419, 1420, and 1421 are configured as illustrated to drive the U-phase winding, the V-phase winding, and the W-phase winding of the second rotary electric unit 3000. Reference numerals 1416, 1417, 1422, and 1423 denote publicly known current sensors; they are, for example, clamp type or non-contact type employing Hall elements, and they respectively detect the currents flowing through the terminals 1403, the terminal 1405, the terminal 1406, and the terminal 1408 and output the detection results in terms of voltage signals. Reference numeral 1418 denotes a publicly known gate driver which drives the gates of the IGBT elements incorporated in the IGBT modules 1413, 1414, and 1415. Reference numeral 1424 denotes a publicly known gate driver which drives the gates of the IGBT elements incorporated in the IGBT modules 1419, 1420, and 1421.

Detailed Description Text (93):
A second embodiment of the hybrid unit in accordance with the invention, which considers the remaining capacity of the electricity accumulating unit, will now be described in conjunction with FIG. 23 through FIG. 26. FIG. 23 shows a schematic system configuration of the invention; like reference numerals as those of the

first embodiment shown in FIG. 1 denote like components. In FIG. 23, a charge state detector 17 has been added as a charge state detecting means to the first embodiment; the charge state detector 17 detects a remaining capacity Soc of the electricity storing unit 15 and it is connected to the electricity storing unit 15. The charge state detector 17 calculates the remaining capacity SOC of the electricity storing unit 15 by a publicly known method primarily according to the current signal coming in and out of the electricity storing unit 15 which is detected by a publicly known current sensor, which is not shown, the terminal voltage signal of the electricity storing unit 15 which is detected by a publicly known voltage sensor, and the temperature signal of the electricity storing unit 15 which is detected by a publicly known temperature sensor, and it transmits the calculation result to the outside. The hybrid controller 16 is connected to the charge state detector 17 to receive the remaining capacity SOC of the electricity e storing unit 15.

Detailed Description Text (95):
In step S6104, the remaining capacity SOC of the electricity storing unit 15 is received through the communication port connected to the charge state detector 17. In the next step S6106, the system decides whether the remaining capacity SOC of the electricity storing unit 15 is smaller than a lower limit value LL; if it decides that SOC is smaller than the lower limit value LL (YES), then it proceeds to step S6112, or if it decides that the remaining capacity SOC of the electricity storing unit 15 is larger than the lower limit value LL (NO), then it proceeds to step S6108. In step S6108, the system decides whether the remaining capacity SOC of the electricity storing unit 15 is larger than an upper limit value UL; if it decides that SOC is larger than the upper limit value UL (YES), then it proceeds to step S6110. In step S6108, if it decides that the remaining capacity SOC of the electricity storing unit 15 is smaller than the larger limit value UL (NO), then it proceeds to a next step S6114.

Detailed Description Text (102):
In step S6204, the remaining capacity SOC of the electricity storing unit 15 is received through the communication port connected to the charge state detector 17. In the next step S6206, the system decides whether the remaining capacity SOC of the electricity storing unit 15 is smaller than the lower limit value LL; if it decides that SOC is smaller than the lower limit value LL (YES), then it proceeds to step S6212, or if it decides that the remaining capacity SOC of the electricity storing unit 15 is larger than the lower limit value LL (NO), then it proceeds to step S6208. In step S6208, the system decides whether the remaining capacity SOC of the electricity storing unit 15 is larger than the upper limit value UL; if it decides that SOC is larger than the upper limit value UL (YES), then it proceeds to step S6210. In step S6208, if the system decides that the remaining capacity SOC of the electricity storing unit 15 is smaller than the larger limit value UL (NO), then it proceeds to the next step S6214. In step S6210, the vehicle driving power demand value Pv* which has been calculated in step S6202 is corrected according to formula 13.

Detailed Description Text (116):
If the energy converting efficiency of the first and second rotary electric units and the inverter 14 driving them is ignored, then the energy generated at the engine 1 can be transmitted to the travel driving system to implement drive forward by supplying the electric power generated by the first rotary electric unit 2000 to the second rotary electric unit 3000 without drawing out electric power from the electricity storing unit 15. If the energy converting efficiency of the first and second rotary electric units and the inverter 14 driving them cannot be ignored, then the electric power is drawn out from the electricity storing unit 15;; however, the hybrid controller 16 monitors the remaining capacity SOC of the electricity storing unit which has been calculated by the charge state detector 17, and it makes a correction by increasing the vehicle driving power demand value Pv* if the remaining capacity SOC is smaller than the predetermined value, or it makes

a correction by decreasing the vehicle driving power demand value Pv* if the remaining capacity Soc is larger than the predetermined value. This enables the vehicle to travel forward without drawing out the electric power from the electricity storing unit 15.

Detailed Description Text (120):
Referring now to FIG. 27 through FIG. 29, a third embodiment of the hybrid unit in accordance with the invention will be described. In the third embodiment, the terminal voltage VB of the electricity storing unit 15 is detected and a correction is made based on the detected terminal voltage VB, while the second embodiment detects the remaining capacity SOC of the electricity storing unit 15 and makes corrections for the D-range and R-range processing according to the detected remaining capacity SOC. The correcting procedure is basically the same as that of the second embodiment, so a brief description will be given below.

Detailed Description Text (121):
In the schematic system configuration in accordance with the invention shown in FIG. 27, a voltage detector 17a is employed in place of the charge state detector 17 in the second embodiment; in the voltage detector 17a, the terminal voltage VB of the electricity storing unit 15 is detected by a publicly known voltage sensor, which is not shown, and it is transmitted outside.

Detailed Description Text (136):
In the following step S5802, the vehicle driving power demand value Pv* is calculated. In the next step S5804A, the remaining capacity SOC of the electricity storing unit 15 is calculated. The remaining capacity SOC is calculated from the current coming in and out of the electricity storing unit 15 which is detected by a publicly known current sensor, not shown, the terminal voltage of the electricity storing unit 15 which is detected by a voltage sensor, not shown, and the temperature of the electricity storing unit 15 which is detected by a temperature sensor, not shown.

Detailed Description Text (164):
Reference numerals 1911 and 1912 denote rotation sensors which are respectively detect the rotational angle positions of the first rotor 1210 and the second rotor 1310. Reference numeral 1730 denotes the end cover which surrounds the brush holder 1610.

Detailed Description Text (192):
(a) In this modification, the current flowing to the electricity storing unit 15 is detected and the current value is employed as a parameter to set the torque command value Mm2* for the second rotary electric unit 3000. In this configuration, even when the output torques of the rotary electric units excessively change as in the transient travel of a vehicle, the current value (charge state) of the electricity storing unit 15 remains stable. The input and output of the electric power between the first and second rotary electric units 2000 and 3000 are also stable. This makes it possible to hold the input and output electric power of the electricity storing unit 15 in a balanced state, enabling the electricity storing unit 15 to be maintained in the normal state for an extended period of time. In other words, the deterioration or damage of the electricity storing unit 15 can be restrained.

Detailed Description Text (198):
* The terminal voltage of the electricity storing unit 15 is adopted as the parameter indicating the charge state of the electricity storing unit 15. In this case, a charge state detecting means is configured by a publicly known voltage detector. In step S5207 of FIG. 11 carried out by the inverter 14, the torque command value Mm2* of the second rotary electric unit 3000 is corrected so that the aforesaid voltage value reaches a predetermined tolerance (e.g. 288 volts of rated voltage).

Detailed Description Text (199):
* The electric power supplied by the electricity storing unit 15 is adopted as the parameter indicating the charge state of the electricity storing unit 15. In this case, a charge state detecting means is configured by a publicly known electric power detector. In step S5207 of FIG. 11 which is carried out by the inverter 14, the torque command value Mm2* of the second rotary electric unit 3000 is corrected so that the aforesaid electric power reaches a predetermined tolerance (e.g. 0 watt).

Detailed Description Text (200):
* The remaining capacity of the electricity storing unit 15 is adopted as the parameter indicating the charge state of the electricity storing unit. Incidentally, the remaining capacity is detected by a remaining capacity detector serving as the charge state detecting means and calculated by a publicly known method according to the current signal of the electricity storing unit 15 which is detected by a publicly known current sensor, the terminal voltage signal of the electricity storing unit 15 which is detected by a publicly known voltage sensor, and the temperature signal of the electricity storing unit 15 which is detected by a publicly known temperature sensor. And in step S5207 of FIG. 11 implemented by the inverter 14, the torque command value Mm2* of the second rotary electric unit 3000 is corrected so that the foregoing remaining capacity is within a predetermined permissible range (e.g. 60 to 80%).

Detailed Description Text (228):
Incidentally, in this embodiment, the program shown in FIG. 52 which is executed by the control unit 1630 of the hybrid controller 16 corresponds to the transient state detecting means described in the appended claims, and the program shown in FIG. 53 corresponds to the torque correcting means. The programs shown in FIG. 52 and FIG. 53 make up the fuel cutoff instructing means. Further, the control unit 1630 of the hybrid controller 16 (the programs of Figs, 15, 16, and 48 through 51) constitutes the torque control amount calculating means, and the control unit 1306 (the program of FIG. 5) of the engine controller 13 constitutes the target rpm calculating means.

Detailed Description Text (240):
(a) In this embodiment, the vehicle transient state corresponding to the acceleration or deceleration of a vehicle is detected, and the torque command values Mm1* and Mm2* for the first and second rotary electric units 2000 and 3000 have been corrected by increasing or decreasing them in accordance with the detection result of the foregoing transient state. Hence, even in the transient drive phase of the engine 1, the problems such as worsened emission or accidental drop in engine output can be solved. As a result, an engine output in exact accordance with the requirement can be obtained, fulfilling an object to improve the responsiveness of the engine 1.

Detailed Description Text (242):
(c) Further in this embodiment, the vehicle driving power demand value Pv* indicative of the torque control amount and the engine rpm command value Ne* indicative of the target rpm are employed for determining the transient state of the vehicle. This enables accurate transient judgment for making corrections by increasing or decreasing the torque command values Mm1* and Mm2* for the first and second rotary electric units 2000 and 3000, thus permitting accurate corrections made by increasing or decreasing the torque command values Mm1* and Mm2* according to the detection result.

Detailed Description Text (247):
To detect the transient drive state of the vehicle, the foregoing embodiment has been adapted to compare the acceleration or deceleration amount .DELTA.Pv* (=Pv*-Pv*i) based on the vehicle driving power demand value Pv* with the predetermined judgment value .DELTA.Po to make a decision (steps S6104B and S6110B of FIG. 52)

and also to judge the converging level of the deviation in the engine speed (=Ne*-Ne) (step S6200A of FIG. 53). This system, however, may be modified. For instance, the transient drive state may be judged only by the acceleration or deceleration amount .DELTA.Pv* based on the vehicle driving power demand value Pv*, or the vehicle driving torque command value Mv* may be employed in place of the vehicle driving power demand value Pv*. In brief, any system may be used as long as the vehicle driving power demand value Pv* and the vehicle driving torque command value Mv* as the torque control amount, or the engine rpm command value Ne* as the target rpm is employed. More broadly, the transient drive state may be detected from the operating amount of the accelerator pedal or the operating amount of the brake pedal.

Detailed Description Text (249):
Another embodiment of the present invention will now be described in conjunction with FIGS. 54, 55, 56, and 57. FIG. 54 shows the outline of the embodiment for a hybrid vehicle control system in accordance with the invention; the configuration of this embodiment differs from the one shown in FIG. 1 in that the merging section of an exhaust pipe 18 of the engine 1 is provided with a publicly known catalytic converter rhodium 19. A heater 19a which performs heating from the electric power supplied from the electricity storing unit 15 is attached to the catalytic converter rhodium 19. In the control system, a remaining capacity detector 17b serving as the charge state detecting means is provided between the inverter 14 and the electricity storing unit 15. The remaining capacity detector 17b calculates the remaining capacity SOC primarily according to the current signal of the electricity storing unit 15 which is detected by a publicly known current sensor, the terminal voltage signal of the electricity storing unit 15 which is detected by a publicly known voltage sensor, and the temperature signal of the electricity storing unit 15 which is detected by a publicly known temperature sensor, and it transmits the calculation result to the hybrid controller 16. The remaining capacity detector 17b in this embodiment detects the terminal voltage VB of the electricity storing unit 15 and sends the detecting result to the hybrid controller 16, in addition to calculating the remaining capacity SOC.

Detailed Description Text (253):
The heater control of the catalytic converter rhodium 19 will now be described. The control unit 1630 of the hybrid controller 16 employs the chart shown in FIG. 57 to execute the heater control program of the catalytic converter rhodium 19. This program is adapted to be triggered by a timer interrupt at predetermined time intervals; after it is initiated, the system first judges in step S6100C whether the terminal voltage VB of the electricity storing unit 15 detected by the remaining capacity detector 17b shown in FIG. 54 exceeds a predetermined level (288 volts of the rated voltage in this embodiment), then in the following step S6102C, the system also determines whether the remaining capacity SOC of the electricity storing unit 15 detected by the remaining capacity detector 17b exceeds a predetermined level (70% in this embodiment). Alternatively, the determination processing of only step S6100C or S6102C may be implemented. Further in step S6104C, the system determines whether the vehicle driving power demand value Pv* is a negative value (minus value).

Detailed Description Text (256):
In this embodiment, the fuel injection controlling means is configured by the program of FIG. 4 executed by the engine controller 13; and a brake state detecting means (step S5105 in the same drawing) and a fuel injection operation means are configured by the program of FIG. 55. The program of FIG. 57 executed by the hybrid controller 16 constitutes the heater controlling means.

Detailed Description Text (268):
(d) Further, this embodiment is adapted to detect the charge state of the electricity storing unit 15 by detecting the terminal voltage VB of the electricity storing unit 15 and the remaining capacity SOC. Therefore, the charge state of the

electricity storing unit 15 can be accurately grasped, allowing the advantages previously described to be achieved easily and accurately.

Detailed Description Text (278):
In the calculation of the first torque command value Mm1* in step S5604 of FIG. 58, the value detected as the actual engine rpm Ne is subjected to the band-stop filter, so that the frequency band related to the engine torque ripple is restricted (step S5603). And the Mm1* value is calculated using the Ne value with the restricted frequency.

Detailed Description Text (289):
FIG. 59 is a diagram showing a modified example of the first embodiment shown in FIG. 1. The modified example is different from the one shown in FIG. 1 in the following point: a publicly known current sensor 18B for measuring the current flowing to the electricity storing unit 15, and a publicly known voltage detector 19B for measuring the terminal voltage of the electricity storing unit 15 are connected to the hybrid controller 16, and the detection results given by these sensors, etc. are applied to the hybrid controller 16.

Detailed Description Text (296):
FIG. 62 shows a modified example of the one shown in FIG. 13 in the first embodiment. The modified example is different from the one shown in FIG. 13 in that the current sensor 18B is connected to an input terminal 1606 and the current signals of the electricity storing unit 15 are applied to the terminal 1606. Connected to the input terminal 1607 is the voltage detector 19B; the voltage signals of the electricity storing unit 15 are applied to the terminal 1607.

Detailed Description Text (297):
The flowchart of FIG. 63 is a modified example of the one shown in FIG. 14 in the first embodiment. The modified example is different from the one shown in FIG. 14 in that the system proceeds to step S5433 after implementing the D-range processing in step S5432, and it carries out the processing for detecting the system state (the processing shown in FIG. 64), which will be discussed later, in step S5433.

Detailed Description Text (298):
The system state detecting processing of step S5433 in the program shown in FIG. 63 will now be described with reference to the flowchart of FIG. 64. In the system state detecting processing, first in step S6100D, the electric power (hereinafter referred to as "battery power Pb") moving in or out of the electricity storing unit (main battery) 15 is calculated, and the calculation result is stored in the variable area of the RAM built in the control unit 1630. The procedure for calculating the Pb value will be discussed later.

Detailed Description Text (301):
where the left side of the above inequality corresponds to the Pdev value. The threshold value Const. 1 is a constant used for controlling the vehicle according to the measurement errors of various sensors including the current sensor 18B and the voltage detector 19B and the state of the system; the value thereof is preset.

Detailed Description Text (310):
The system state detection in the operation of this embodiment will now be described. First, the electric power balance Pdev of the entire system is determined from the battery power Pb, the electric power balance Pm of the first and second rotary electric units 2000 and 3000, and the losses Pd1 and Pd2 of the inverter and the rotary electric units (formula 32 shown below):

Detailed Description Text (311):
This Pdev value is compared with predetermined threshold values (steps S6106D and S6108D of FIG. 64). In this case, a plurality of threshold values are set to achieve vehicle control according to the measurement errors of various sensors

including the current sensor 18B and the voltage detector 19B and the system state. To be more specific, two threshold values, namely, Const.1 and Const.2, are set; it is determined whether the control system state is in the normal mode, a vehicle output limit mode, or a vehicle stop mode according to the Pdev value.

Detailed Description Text (315):
If Const.1.ltoreq.Pdev<Const.2 (if "NO" in step S6106D and "YES" in step S6108D), it is determined that some minor failure is present although no serious failure has occurred in the control system. And an alarm is given to a passenger of the vehicle, the inflow or outflow of electric power to or from the battery is restricted, and the output torque of second rotary electric unit 3000 is restricted (step S6112D). It is determined that a failure has taken place in this mode if, for example, a sensor gain drops with a consequent detection error. In this case, the vehicle is pulled over or headed to a body shop, with vehicle output restricted.

Detailed Description Text (328):
(3) Torque sensors (torque detecting means) composed of strain gauges are provided on the output shafts of the first and second rotary electric units 2000 and 3000, and the electric power balance Pm is calculated from the detection results of the torque sensors. Any of the configurations described in (1) through (3) permits proper monitoring of the system. Moreover, the calculation results obtained by the foregoing techniques correspond to the drive information of the actual machine, so that the accuracy of monitoring the control system is improved.

Detailed Description Text (341):
In the above embodiment-, the processing of detecting the system state for constituting the failure detecting means (step S5433 of FIG. 63, and FIG. 64) has been implemented by the hybrid controller 16; this configuration, however, may be modified. For instance, a microcomputer for monitoring the system may be used, and the processing of detecting the system state may be carried out by the microcomputer.

Detailed Description Text (377):
Yet another embodiment of the present invention will now be described in conjunction with FIGS. 59, 72 through 78. This embodiment has been modified over the previous embodiment, the configuration of which is shown in FIG. 59; hence, the schematic configuration of this embodiment will be first described with reference to FIG. 59. The hybrid controller 16 receives the output signal of the voltage 40 detector 19 for detecting the voltage of the electricity storing unit 15, and the output signal of the current sensor 18B for detecting the current going out of the electricity storing unit 15. The voltage detection result, i.e. the terminal voltage signal (VB) of the electricity storing unit 15, and the current detection result, i.e. a current signal (IB) going in and out of the electricity storing unit 15, are supplied to the hybrid controller 16. Also, the detection result given by a publicly known temperature sensor, not shown, i.e. a temperature signal (TB) of the electricity storing unit 15 is supplied to the hybrid controller 16.

Detailed Description Text (380):
FIG. 75 shows the hybrid controller in this embodiment which is different from the one shown in FIG. 13 in the first embodiment as follows: a communication section 1660 which shares the same configuration as the communication section 1640 or 1650 is provided between the control unit 1630 and the communication terminal 1606. The communication terminal 1606 is connected to an electricity storing unit monitoring means 15A. The electricity storing unit monitoring means 15A is a generic term for the voltage detector 19B, the current sensor 18B, and the temperature sensor, not shown, mentioned above. The voltage signal (VB) of the electricity storing unit 15, the current signal (IB), and the temperature signal (TB) are supplied to the hybrid controller 16.

CLAIMS:

3. A controller for a hybrid vehicle according to claim 1, further comprising:

charge state detecting means for detecting the charge state of said electricity storing means; and

command data setting means for setting a torque command value for said second rotary electric unit or a target rpm of said engine, using said charge state of said electricity storing means as a parameter.

4. A controller for a hybrid vehicle according to claim 3, wherein:

said charge state detecting means detects the voltage, current, power, or remaining capacity of said electricity storing unit; and

said command data setting means sets the torque command value of said second rotary electric unit such that the voltage, current, power, or remaining capacity of said electricity storing unit remains constant or stays in a predetermined permissible range.

5. A controller for a hybrid vehicle according to claim 3, wherein:

said charge state detecting means detects the voltage, current, power, or remaining capacity of said electricity storing unit; and

said command data setting means sets the target rpm of said engine such that the voltage, current, power, or remaining capacity of said electricity storing unit remains constant or stays in a predetermined permissible range.

9. A controller for a hybrid vehicle according to claim 8, comprising:

charge state detecting means for detecting the charge state of said electricity storing unit;

wherein said heater controlling means energizes and heats said heater when only the charge state of said electricity storing unit reaches a predetermined charge level.

10. A controller for a hybrid vehicle according to claim 9, wherein said charge state detecting means detects the voltage or the remaining capacity or said electricity storing unit.

21. A controller or system for a hybrid vehicle according to any one of claims 1 to 20, further comprising charge state detecting means for detecting the charge state of said electricity storing means; wherein said hybrid controller increases or decreases at least said vehicle driving torque command value, said power demand value, or said engine rpm command value to make a correction according to the charge state information on the electricity storing means supplied by the charge state detecting means.

22. A control system for a hybrid vehicle according to claim 20, further comprising voltage detecting means for detecting the voltage of said electricity storing means; wherein said hybrid controller increases or decreases at least said vehicle driving torque command value, said power demand value, or said internal-combustion engine rpm command to make a correction in order to maintain said electricity storing means at a predetermined voltage at all times according to the voltage of the electricity storing means detected by the voltage detecting means.

33. A controller for a hybrid vehicle according to claim 32, further including remaining capacity detecting means for detecting the remaining capacity of said

electricity storing unit;

wherein, if the remaining capacity of said electricity storing unit falls to a predetermined value or lower, then said hybrid controller corrects said vehicle driving power demand value or said vehicle driving torque command value or said engine rpm command value to at least maintain said remaining capacity.

34. A controller for a hybrid vehicle applied to a hybrid vehicle provided with an engine, power converting means which is connected to the engine and which includes a first rotary electric unit for deciding engine rpm and a second rotary electric unit for deciding the driving force of the vehicle, an inverter for driving said first and second rotary electric units, and an electricity storing unit electrically connected to the inverter;

wherein the output torque of said engine is controlled according to vehicular drive information, and the torque values for said first and second rotary electric units are controlled according to the torque control amount and the target rpm of said engine corresponding to the characteristics of said engine;

said controller for a hybrid vehicle comprising:

transient state detecting means for detecting a vehicle transient state corresponding to the acceleration or deceleration of the vehicle; and

torque correcting means which corrects the torque command value for said first rotary electric unit by decreasing it and also corrects the torque command value for said second rotary electric unit by increasing it if the vehicle is being accelerated, while it corrects the torque command value for said first rotary electric unit by increasing it and also corrects the torque command value for said second rotary electric unit by decreasing it if the vehicle is being decelerated, according to a detection result of said transient state.

36. A controller for a hybrid vehicle according to claim 34 or 35, comprising torque control amount calculating means for calculating the torque control amount based on vehicular drive information;

wherein said transient state detecting means detects that the vehicle is being accelerated if said calculated torque control amount exceeds a predetermined judgment value and shifts to an increase, while it detects that the vehicle is being decelerated if said calculated torque control amount exceeds the judgment value and shifts to a decrease.

38. A controller for a hybrid vehicle according to claim 34 or claim 35, comprising:

target rpm calculating means for calculating the target rpm of said engine according to the vehicle drive state, the torque value of said first rotary electric unit being controlled according to the difference between the calculated target rpm of the engine and an actual engine rpm;

wherein said transient state detecting means detects that the vehicle is being accelerated if said calculated target rpm of the engine exceeds a predetermined judgment value and shifts to an increase, while it detects that the vehicle is being decelerated if said calculated target rpm of the engine exceeds the judgment value and shifts to a decrease.

50. A controller for a hybrid vehicle according to claim 48, wherein the electric power balance in said first and second rotary electric units is calculated from the output torque values and rpms of the respective rotary electric units obtained from torque detecting means or torque estimating means.

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Refine Search

Search Results -

Terms	Documents
L24 and detect$	1

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L26

Refine Search

Recall Text

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Interrupt

Search History

DATE: Friday, June 30, 2006 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
	DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L26	L24 and detect$	1	L26
L25	L24 and detct$	0	L25
L24	6018694.pn.	1	L24
	DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L23	"two-wheel" and motocycle	2	L23
L22	"two-wheel" and motocycle and detect$	0	L22
L21	"two-wheel" and abnormal$ and motocycle and detect$	0	L21
L20	l17 not L19	4	L20
L19	L18 and detect$	16	L19
L18	L17 and stop$	17	L18
L17	"two-wheel" and abnormal$.clm.	20	L17
	DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR		
L16	motocycle and detect$.clm. and condition.clm.	0	L16

DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR

L15	motocycle and abnormal$.clm.	0	L15

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L14	L8 and abnormal$	1	L14
L13	L8 and abnormal$ and (driv$ with mechanism$)	0	L13
L12	L5 and abnormal$ and (driv$ with mechanism$)	229	L12
L11	L8 and (abnormal$).clm.	0	L11
L10	L8 and (abnormal$ and (driv$ with mechanism$)).ab.	0	L10
L9	L8 and (abnormal$ and (driv$ with mechanism$)).clm.	0	L9

DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR

L8	obayashi and (load$ with vehicle) and (motor with force)	5	L8

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L7	L6 and (701/97).ccls.	2	L7
L6	L4 or L5	280	L6
L5	L3 and @pd<=20021227	229	L5
L4	L3 and @ad<=20021227	273	L4
L3	L1 and (detect$ with abnormal$)	420	L3
L2	L1 and detect$	936	L2
L1	vehicle and abnormal$ and (driv$ with mechanism$) and wheel$	1469	L1

END OF SEARCH HISTORY

Hit List

First Hit Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 2 of 2 returned.

1. Document ID: US 6178372 B1

L7: Entry 1 of 2 File: USPT Jan 23, 2001

US-PAT-NO: 6178372
DOCUMENT-IDENTIFIER: US 6178372 B1

TITLE: Motor vehicle drive system controller and automatic drive controller

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. D

2. Document ID: US 6125321 A

L7: Entry 2 of 2 File: USPT Sep 26, 2000

US-PAT-NO: 6125321
DOCUMENT-IDENTIFIER: US 6125321 A

TITLE: Motor vehicle drive system controller and automatic drive controller

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. D

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L6 and (701/97).ccls.	2

Display Format: - Change Format

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Search Results - Record(s) 1 through 5 of 5 returned.

1. Document ID: US 20060066287 A1

L8: Entry 1 of 5 File: PGPB Mar 30, 2006

PGPUB-DOCUMENT-NUMBER: 20060066287
PGPUB-FILING-TYPE:
DOCUMENT-IDENTIFIER: US 20060066287 A1

TITLE: Method and system for controlling power to be fed to electrical loads

PUBLICATION-DATE: March 30, 2006

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Obayashi; Kazuyoshi	Chita-gun		JP
Fujitsuna; Masami	Kariya-shi		JP

US-CL-CURRENT: 322/25

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. D

2. Document ID: US 6554088 B2

L8: Entry 2 of 5 File: USPT Apr 29, 2003

US-PAT-NO: 6554088
DOCUMENT-IDENTIFIER: US 6554088 B2

TITLE: Hybrid vehicles

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. D

3. Document ID: US 6362536 B1

L8: Entry 3 of 5 File: USPT Mar 26, 2002

US-PAT-NO: 6362536
DOCUMENT-IDENTIFIER: US 6362536 B1
**** See image for Certificate of Correction ****

TITLE: Apparatus and method for controlling power generation for hybrid vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw D

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4. Document ID: US 6018694 A

L8: Entry 4 of 5 File: USPT Jan 25, 2000

US-PAT-NO: 6018694
DOCUMENT-IDENTIFIER: US 6018694 A

TITLE: Controller for hybrid vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw D

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5. Document ID: US 5917248 A

L8: Entry 5 of 5 File: USPT Jun 29, 1999

US-PAT-NO: 5917248
DOCUMENT-IDENTIFIER: US 5917248 A

TITLE: System and method for driving electric vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw D

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
obayashi and (load$ with vehicle) and (motor with force)	5

Display Format: [-] Change Format

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L14: Entry 1 of 1 File: USPT Jan 25, 2000

US-PAT-NO: 6018694
DOCUMENT-IDENTIFIER: US 6018694 A

TITLE: Controller for hybrid vehicle

DATE-ISSUED: January 25, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Egami; Tsuneyuki	Gamagori			JP
Fujita; Hiroshi	Kariya			JP
Banzai; Keiichiro	Toyota			JP
Sawada; Takeshi	Chiryu			JP
Tsuji; Hiroya	Kariya			JP
Obayashi; Kazuyoshi	Kariya			JP
Kajiura; Hiroaki	Nagoya			JP
Seguchi; Masahiro	Oobu			JP
Kurita; Toyoaki	Kariya			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Denso Corporation	Kariya			JP	03

APPL-NO: 09/049114 [PALM]
DATE FILED: March 27, 1998

PARENT-CASE:
This is a continuation-in-part of application PCT/JP97/02653 filed Jul. 30, 1997.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	8-200259	July 30, 1996
JP	8-239380	September 10, 1996
JP	8-241862	September 12, 1996
JP	8-246228	September 18, 1996
JP	8-311870	November 22, 1996
JP	9-040601	February 25, 1997
JP	9-040602	February 25, 1997
JP	9-040603	February 25, 1997
JP	9-186732	July 11, 1997

INT-CL-ISSUED: [06] B06 L 11/00

US-CL-ISSUED: 701/102; 701/110, 701/114, 701/22, 180/65.2, 180/65.4
US-CL-CURRENT: 701/102; 180/65.2, 180/65.4, 701/110, 701/114, 701/22, 903/905, 903/906, 903/922, 903/924, 903/940, 903/941, 903/942, 903/943, 903/947, 903/948, 903/952

FIELD-OF-CLASSIFICATION-SEARCH: 701/102, 701/110, 701/114, 701/22, 701/24, 701/84, 180/65.1, 180/65.2, 180/65.4, 318/139, 318/148
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4305254	December 1981	Kawakatsu et al.	701/102
☐	4335429	June 1982	Kawakatsu	364/424
☐	5264764	November 1993	Kuang	180/65.4
☐	5778997	July 1998	Setaka et al.	180/65.2
☐	5786640	July 1998	Sakai et al.	180/65.2
☐	5789881	August 1998	Egami et al.	180/65.4

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0743208	November 1996	EP	
0743217	November 1996	EP	
0743216	November 1996	EP	
0743215	November 1996	EP	
0743214	November 1996	EP	
0743213	November 1996	EP	
0743212	November 1996	EP	
0743211	November 1996	EP	
0743210	November 1996	EP	
0743209	November 1996	EP	
44 07 666	September 1995	DE	
55-127221	October 1980	JP	
58-130704	August 1983	JP	
59-37241	February 1984	JP	
7135701	May 1995	JP	
7298408	November 1995	JP	
861193	March 1996	JP	
898319	April 1996	JP	

8294205	November 1996	JP
9266601	October 1997	JP

ART-UNIT: 377

PRIMARY-EXAMINER: Wolfe; Willis R.

ASSISTANT-EXAMINER: Vo; Hieu T.

ATTY-AGENT-FIRM: Pillsbury Madison & Sutro LLP

ABSTRACT:

A gas-sparing vehicle is achieved by a control system for a hybrid vehicle equipped at least with: a hybrid engine which includes at least a first rotary electric unit for deciding the rpm of the engine and a second rotary electric unit for deciding the driving force of the vehicle and which has power converting means connected to the output shaft of the engine; and electricity storing means. In one embodiment, a hybrid controller 16 controls the drive of a first rotary electric unit 2000 according to a startup torque command value which is decided based on the rpm of an engine at the time of engine startup and which decreases as the rpm increases; it also determines that the complete explosion in an engine 1 has occurred when the startup torque command value falls below a predetermined complete explosion judgment value.

58 Claims, 87 Drawing figures

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L14: Entry 1 of 1 File: USPT Jan 25, 2000

DOCUMENT-IDENTIFIER: US 6018694 A
TITLE: Controller for hybrid vehicle

INVENTOR (6):
Obayashi; Kazuyoshi

Inventor Group (6):
Obayashi; Kazuyoshi Kariya JP

Brief Summary Text (20):
According to the system set forth in claim 6, when a vehicle is driven under high load in such a case as starting the vehicle or climbing a slope and energy is brought out transiently from the electricity storing means, the voltage for keeping the electricity storing unit fully or almost fully charged is maintained. Therefore, such a problem as the failure to fully provide the expected driving performance due to insufficient driving power of the vehicle will no longer arise.

Brief Summary Text (28):
The configuration described above makes it possible to maintain good torque balance between the engine and the rotary electric units at the time of engine startup, enabling stable vehicle behavior. As a result, such an inconvenience, in which the torque of the first rotary electric unit (first motor) acts as a reaction force on the driving shaft of the vehicle to cause the vehicle to move forward or backward or the engine rpm to go up excessively at the completion of the engine startup, can be controlled.

Drawing Description Text (35):
FIG. 33 is an axial sectional view illustrative of an embodiment of a load driving unit constituting a power converting means which has a first rotary electric unit and a second rotary electric unit of a hybrid vehicle controller in accordance with the present invention;

Detailed Description Text (155):
Reference numeral 700 denotes a driving wheel composed primarily of a load output vehicle tire or the like. A joint and a decelerator (including a speed increaser), which are extensively used for typical vehicles driven by internal-combustion engines, and other components are provided between the engine 100 and the T-S converter 1000; however, they are not illustrated in the embodiment. Likewise, a decelerator 800, a differential gear 900, etc. are provided between the T-S converter 1000 and the driving wheel 700.

Detailed Description Text (265):
(a) In this embodiment, it is determined that the vehicle is in the brake state when the vehicle driving power demand value Pv* (the torque control amount of the engine) is a negative value, and the fuel is cut off while the vehicle is being braked. This reduces the engine output torque, and the engine 1 becomes the load of the first and second rotary electric units 2000 and 3000, causing the excess energy

5 generated during the brake state of the vehicle to be consumed by the first and second rotary electric units 2000 and 3000. Thus, such problems as overcharge of the electricity storing unit 15 can be avoided, protecting the electricity storing unit 15. Moreover, the inertial energy of the vehicle during the brake is absorbed by the engine 1, so that the operating efficiency of the engine 1 can be improved, leading to advantages including improved fuel economy and reduced emission.

Detailed Description Text (288):
Yet another embodiment of the present invention will be described in conjunction with FIG. 59 through FIG. 65. In this embodiment, the output torque of the engine is controlled according to the vehicle drive information such as the information on the operation of the accelerator pedal, brake pedal, and shift lever, and the values of the torques to be generated by the first and second rotary electric units are controlled according to the torque control amount (vehicle driving power demand value Pv*, vehicle driving torque command value Mv*) in the foregoing control of the engine output torque and also according to the target rpm of the engine (engine rpm command value Ne*) corresponding to the engine characteristics. Further in this embodiment, the balance of the energy in the hybrid control system is calculated from first information on the electricity storing unit and second information on the first and second rotary electric units. Based on the calculated balance of the energy, it is determined whether there is any abnormal condition in the hybrid control system. The hybrid control system mainly includes, for example, the first and second rotary electric units, the inverter, the electricity storing unit, and the various controllers governing the hybrid control. The balance of the energy is obtained from various types of information on the electricity storing unit and the first and second rotary electric units.

Detailed Description Text (373):
(a) In this embodiment, the startup torque command value Msta* based on the engine startup state is read and set as the first torque command value Mm1* at the beginning of the startup of the engine 1, and the second torque command value Mm2* is set such that the sum of this value and the first torque command value Mm1* is "0" (Mm1*+Mm2*=0). This makes it possible to maintain a good torque balance between the engine 1 and the first and second rotary electric units 2000 and 3000 at the engine startup, thus permitting stable behavior of the vehicle. As a result, such problems with a conventional system, in which the torque of the first rotating electric unit (the first motor) 2000 acts as a reaction force to the driving shaft of the vehicle, causing the vehicle to go forward or reverse, or the engine rpm increases excessively before the startup of the engine 1 is completed, can be solved. In this embodiment, the engine startup state corresponds to the engine rpm before the startup is completed.

Detailed Description Text (453):
(d) The startup torque command value Msta* is read and set as the first torque command value Mm1* at the beginning of the startup of the engine 1, and the second torque command value Mm2* is set such that the sum thereof and the set first torque command value Mm1* becomes "0" (Mm1*+Mm2*=0). In this case, it is possible to maintain good torque balance between the engine 1 and the first and second rotary electric units 2000 and 3000, respectively, at the time of engine startup, enabling stable vehicle behavior. As a result, such an inconvenience, in which the torque of the first rotary electric unit (first motor) 2000 acts as a reaction force on the driving shaft of the vehicle to cause the vehicle to move forward or backward or the engine rpm to go up excessively at the startup completion of the engine 1, can be controlled.

CLAIMS:

2. A controller for a hybrid vehicle according to claim 1, wherein: said power converting means comprises a housing, relatively rotatable first and second rotors which are placed in said housing and which transmit a torque from said engine to a

load output, and a stator secured to said housing; said second rotor comprises a first magnetic circuit which performs mutual electromagnetic action by rotary drive relative to said first rotor and a second magnetic circuit which performs mutual electromagnetic action by rotary drive relative to said stator; said first rotor is provided with a first coil which makes it possible to control, by energization, the relative angular velocity and the torque with respect to said second rotor so as to constitute a first rotary electric unit together with said first magnetic circuit, and said stator is provided with a second coil which makes it possible to control, by energization, the relative velocity and the torque with respect to said second rotor so as to constitute a second rotary electric unit together with said second magnetic circuit; either said first rotor or said second rotor is joined to said engine and rotationally driven as said engine is driven, while the other rotor is joined to said load output; said first rotor and second rotor, and stator are disposed concentrically; said second rotor is disposed inside said stator, while said first rotor is disposed inside said second rotor, a magnetic pole of said second rotor being composed of a permanent magnet; and an input shaft coupled to said engine in said first rotor and said second rotor and an output shaft coupled to the load output are disposed on the same side of said housing.

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L14: Entry 1 of 1 File: USPT Jan 25, 2000

US-PAT-NO: 6018694
DOCUMENT-IDENTIFIER: US 6018694 A

TITLE: Controller for hybrid vehicle

DATE-ISSUED: January 25, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Egami; Tsuneyuki	Gamagori			JP
Fujita; Hiroshi	Kariya			JP
Banzai; Keiichiro	Toyota			JP
Sawada; Takeshi	Chiryu			JP
Tsuji; Hiroya	Kariya			JP
Obayashi; Kazuyoshi	Kariya			JP
Kajiura; Hiroaki	Nagoya			JP
Seguchi; Masahiro	Oobu			JP
Kurita; Toyoaki	Kariya			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Denso Corporation	Kariya			JP	03

APPL-NO: 09/049114 [PALM]
DATE FILED: March 27, 1998

PARENT-CASE:
This is a continuation-in-part of application PCT/JP97/02653 filed Jul. 30, 1997.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	8-200259	July 30, 1996
JP	8-239380	September 10, 1996
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JP	9-040601	February 25, 1997
JP	9-040602	February 25, 1997
JP	9-040603	February 25, 1997
JP	9-186732	July 11, 1997

INT-CL-ISSUED: [06] B06 L 11/00

US-CL-ISSUED: 701/102; 701/110, 701/114, 701/22, 180/65.2, 180/65.4
US-CL-CURRENT: 701/102; 180/65.2, 180/65.4, 701/110, 701/114, 701/22, 903/905, 903/906, 903/922, 903/924, 903/940, 903/941, 903/942, 903/943, 903/947, 903/948, 903/952

FIELD-OF-CLASSIFICATION-SEARCH: 701/102, 701/110, 701/114, 701/22, 701/24, 701/84, 180/65.1, 180/65.2, 180/65.4, 318/139, 318/148
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected | Search ALL | Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4305254	December 1981	Kawakatsu et al.	701/102
☐	4335429	June 1982	Kawakatsu	364/424
☐	5264764	November 1993	Kuang	180/65.4
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☐	5786640	July 1998	Sakai et al.	180/65.2
☐	5789881	August 1998	Egami et al.	180/65.4

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0743208	November 1996	EP	
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0743215	November 1996	EP	
0743214	November 1996	EP	
0743213	November 1996	EP	
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0743210	November 1996	EP	
0743209	November 1996	EP	
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898319	April 1996	JP	

8294205	November 1996	JP
9266601	October 1997	JP

ART-UNIT: 377

PRIMARY-EXAMINER: Wolfe; Willis R.

ASSISTANT-EXAMINER: Vo; Hieu T.

ATTY-AGENT-FIRM: Pillsbury Madison & Sutro LLP

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58 Claims, 87 Drawing figures

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L14: Entry 1 of 1 File: USPT Jan 25, 2000

DOCUMENT-IDENTIFIER: US 6018694 A
TITLE: Controller for hybrid vehicle

INVENTOR (6):
Obayashi; Kazuyoshi

Inventor Group (6):
Obayashi; Kazuyoshi Kariya JP

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Detailed Description Text (288):
Yet another embodiment of the present invention will be described in conjunction with FIG. 59 through FIG. 65. In this embodiment, the output torque of the engine is controlled according to the vehicle drive information such as the information on the operation of the accelerator pedal, brake pedal, and shift lever, and the values of the torques to be generated by the first and second rotary electric units are controlled according to the torque control amount (vehicle driving power demand value Pv*, vehicle driving torque command value Mv*) in the foregoing control of the engine output torque and also according to the target rpm of the engine (engine rpm command value Ne*) corresponding to the engine characteristics. Further in this embodiment, the balance of the energy in the hybrid control system is calculated from first information on the electricity storing unit and second information on the first and second rotary electric units. Based on the calculated balance of the energy, it is determined whether there is any abnormal condition in the hybrid control system. The hybrid control system mainly includes, for example, the first and second rotary electric units, the inverter, the electricity storing unit, and the various controllers governing the hybrid control. The balance of the energy is obtained from various types of information on the electricity storing unit and the first and second rotary electric units.

Detailed Description Text (373):
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Detailed Description Text (453):
(d) The startup torque command value Msta* is read and set as the first torque command value Mm1* at the beginning of the startup of the engine 1, and the second torque command value Mm2* is set such that the sum thereof and the set first torque command value Mm1* becomes "0" (Mm1*+Mm2*=0). In this case, it is possible to maintain good torque balance between the engine 1 and the first and second rotary electric units 2000 and 3000, respectively, at the time of engine startup, enabling stable vehicle behavior. As a result, such an inconvenience, in which the torque of the first rotary electric unit (first motor) 2000 acts as a reaction force on the driving shaft of the vehicle to cause the vehicle to move forward or backward or the engine rpm to go up excessively at the startup completion of the engine 1, can be controlled.

CLAIMS:

2. A controller for a hybrid vehicle according to claim 1, wherein: said power converting means comprises a housing, relatively rotatable first and second rotors which are placed in said housing and which transmit a torque from said engine to a

load output, and a stator secured to said housing; said second rotor comprises a first magnetic circuit which performs mutual electromagnetic action by rotary drive relative to said first rotor and a second magnetic circuit which performs mutual electromagnetic action by rotary drive relative to said stator; said first rotor is provided with a first coil which makes it possible to control, by energization, the relative angular velocity and the torque with respect to said second rotor so as to constitute a first rotary electric unit together with said first magnetic circuit, and said stator is provided with a second coil which makes it possible to control, by energization, the relative velocity and the torque with respect to said second rotor so as to constitute a second rotary electric unit together with said second magnetic circuit; either said first rotor or said second rotor is joined to said engine and rotationally driven as said engine is driven, while the other rotor is joined to said load output; said first rotor and second rotor, and stator are disposed concentrically; said second rotor is disposed inside said stator, while said first rotor is disposed inside said second rotor, a magnetic pole of said second rotor being composed of a permanent magnet; and an input shaft coupled to said engine in said first rotor and said second rotor and an output shaft coupled to the load output are disposed on the same side of said housing.

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